Cape Elizabeth Quadrangle, Maine

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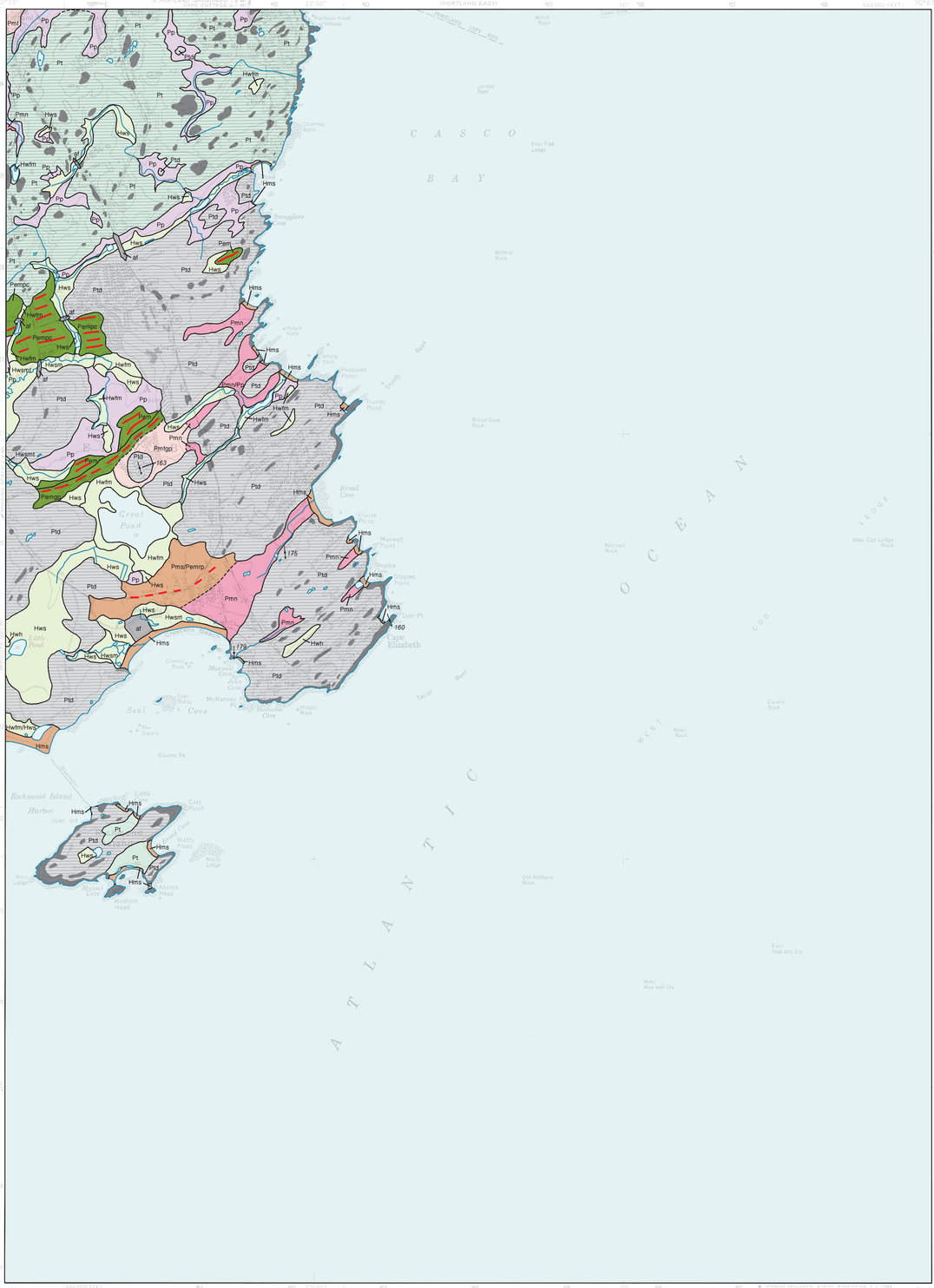
For additional information,
see Open-File Report 99-111.

Surficial Geology



SOURCES OF INFORMATION

Surficial geologic mapping by J. Michael Clinch and Woodrow B. Thompson completed during the 1987 field season; funding for this work provided by the U. S. Geological Survey COGEOMAP program. Wetlands data provided in part by Cornelia C. Cameron, U.S. Geological Survey, 1988. Geologic unit designations and contacts revised and matched to adjacent quadrangles in 1999 by MGS geologists.

Quadrangle Location

SCALE 1 : 24,000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET

TRUE NORTH

Topographic base from U.S. Geological Survey Cape Elizabeth quadrangle, scale 1:24,000 using standard U.S. Geological Survey topographic map symbols.

The use of industry, firm, or local government names on this map is for location purposes only and does not imply responsibility for any present or potential effects on the natural resources.

af - **Artificial fill -** Includes landfills, highway and railroad embankments, and dredge spoil areas. These units are mapped only where they are resolvable using the contour lines on the map, or where they define the limits of wetland units. Minor artificial fill is present in virtually all developed areas of the quadrangle.

Hms - **Marine shoreline deposits -** Sand to gravel beaches and associated sand dunes.

Hwsm - **Salt marshes*** - Located along the Spurwink River. Thin, non-commercial peat layers are present atop a mineral substrate consisting of estuarine sands and muds.

Hws - **Swamp -** With no peat present, distinguished from other wetlands by the presence of trees.

Hwh - **Heath -** With no peat present, distinguished from other wetlands by the absence of trees and the presence of shrubs.

Hwfm - **Freshwater marsh -** With no peat present, distinguished from other wetlands by the presence of only grasses and sedges.

Pms - **Marine shoreline -** Beach and dune sands overlying the Richards Pond end moraine (Pms/Pemrp). Beach morphology is poorly preserved, but sands are present along the ridge crest.

Pmn - **Nearshore deposits -** A wave reworked blanket of sand, fine gravel, or silty sand present along hillslopes and at the foot of these slopes. This unit is mapped only where it completely obscures the underlying materials and morphology.

Pp - **Presumpscot Formation -** Massive to laminated silty clay with rare dropstones and occasional shelly horizons, which overlies bedrock and till exposures, and is interbedded with and overlies end moraines and marine fan deposits.

Pem - **End moraines -** linear ridges consisting of bedded sand and gravel interbedded with Presumpscot Formation silty clays and overlain by till on the ice-proximal face of the moraine. Uncorrelated end moraines are labeled Pem, while those that can be used to reconstruct major ice marginal positions are also given a local geographic name, listed below:

Pemrp - Richards Pond end moraine
Pemgp - Great Pond end moraine
Pempc - Pond Cove end moraine cluster

Pmf - **Submarine fans -** Thick sand and gravel accumulations formed at the mouth of subglacial tunnels at Pleistocene ice margins. The sand and gravel is interbedded with and overlain by Presumpscot Formation clays at the distal edges of the fans, and interlayered with and overlain by tills at their ice-contact faces. Each fan, or group of fans has been assigned a unique geographical name, listed below:

Pmfgp - Great Pond marine fan

The correlations of these marine fan deposits and the end moraines are shown in Clinch and Thompson (1994).

Pt - **Till -** Gravelly to bouldery, sandy matrixed diamicton.

Ptd - **Thin drift areas -** Areas with less than ten feet of drift covering bedrock. Till commonly overlies bedrock on hillslopes and ridge crests; Presumpscot Formation silty clays are present in depressions; and nearshore deposits may overlie till, Presumpscot Formation, and bedrock on hillslopes and at the base of these slopes. Small rock outcrops, and areas of numerous small outcrops are shown as gray areas.

fe - **Bedrock outcrops/thin drift areas -** Gray areas are individual bedrock outcrops, with little or no surficial sediment cover. Ruled pattern indicates areas of abundant bedrock outcrop and/or areas where the mapped surficial sediments are generally less than 10 ft (3 m) thick.

Contact - Boundary between map units. Dashed where very approximate.

Striations - Observations made at dot.

End moraine crests.

Areas where original topography is disturbed by excavation (chiefly gravel pits).

*NOTE: Wetland symbols followed by "f" indicate areas where peat deposits probably do not constitute a significant commercial resource, either because they are thin (< 1.5 m), or they have an ash content greater than 25 percent. Symbols followed by "p" indicate peat deposits that are thicker (generally > 1.5 m), with ash content less than 25 percent, and thus may be suitable for commercial applications.

USES OF SURFICIAL GEOLOGY MAPS

A surficial geology map shows all the loose materials such as till (commonly called hardpan), sand and gravel, or clay, which overlie solid ledge (bedrock). Bedrock outcrops and areas of abundant bedrock outcrops are shown on the map, but varieties of the bedrock are not distinguished (refer to bedrock geology map). Most of the surficial materials are deposits formed by glacial and deglacial processes during the last stage of continental glaciation, which began about 25,000 years ago. The remainder of the surficial deposits are the products of postglacial geologic processes, such as river floodplains, or are attributed to human activity, such as fill or other land-modifying features.

The map shows the areal distribution of the different types of glacial features, deposits, and landforms as described in the map explanation. Features such as striations and moraines can be used to reconstruct the movement and position of the glacier and its margin, especially as the ice sheet melted. Other ancient features include shorelines and deposits of glacial lakes or the glacial sea, now long gone from the state. This glacial geologic history of the quadrangle is useful to the larger understanding of past earth climate, and how our region of the world underwent recent geologically significant climatic and environmental changes. We may then be able to use this knowledge in anticipation of future similar changes for long-term planning efforts, such as coastal development or waste disposal.

Surficial geology maps are often best used in conjunction with related maps such as surficial materials maps or significant sand and gravel aquifer maps for anyone wanting to know what lies beneath the land surface. For example, these maps may aid in the search for water supplies, or economically important deposits such as sand and gravel for aggregate or clay for bricks or pottery. Environmental issues such as the location of a suitable landfill site or the possible spread of contaminants are directly related to surficial geology. Construction projects such as locating new roads, excavating foundations, or siting new homes may be better planned with a good knowledge of the surficial geology of the site. Refer to the list of related publications below.

OTHER SOURCES OF INFORMATION

1. Clinch, J. M., and Thompson, W. B., 1999, Surficial geology of the Cape Elizabeth 7.5-minute quadrangle, Cumberland and York Counties, Maine: Maine Geological Survey, Open-File Report 99-111, 12 p.
2. Clinch, J. M., and Thompson, W. B., 1999, Surficial materials of the Cape Elizabeth quadrangle, Maine: Maine Geological Survey, Open-File Map 99-42.
3. Thompson, W. B., 1979, Surficial geology handbook for coastal Maine: Maine Geological Survey, 68 p. (out of print)
4. Thompson, W. B., and Borns, H. W., Jr., 1985, Surficial geologic map of Maine: Maine Geological Survey, scale 1:500,000.
5. Thompson, W. B., Crossen, K. J., Borns, H. W., Jr., and Andersen, B. G, 1989, Glaciomarine deltas of Maine and their relation to late Pleistocene-Holocene crustal movements, *in* Anderson, W. A., and Borns, H. W., Jr. (eds.), Neotectonics of Maine: Maine Geological Survey, Bulletin 40, p. 43-67.